REMARKS

In the Office Action, the Examiner objected to the specification as not containing an Abstract on a separate sheet. In response, the Abstract previously provided only on the title page of the PCT Application in this case is supplied on a separate sheet.

The Examiner objected to claims 2 and 3 as containing informalities and rejected claims 8-14 under 35 U.S.C. § 112, second paragraph, as being indefinite. In this latter rejection, the Examiner noted that it is not clear whether a multiplexer is or is not included in claim 8 and for that reason, the dependent claims 9-14 also are rejected.

Each of claims 1-14 has been amended to place these claims in conformance with U.S. claim practice. As a result, the informalities noted by the Examiner with respect to claims 2 and 3, as well as the basis for the rejection of claims 8-14 under 35 U.S.C. § 112, second paragraph, are obviated. Also in this respect, it is noted that claim 8 has been amended to positively recite the multiplexer, whereas new claim 15 is patterned after claim 8, but recites only one mechanical part and does not include the multiplexer.

The Examiner rejected claims 1-3 under 35 U.S.C. § 103(a) as being unpatentable over Martin et al. (U.S. Patent No. 5,438,322) in view of Bauerschmidt et al. (U.S. Patent No. 6,239,723); rejected claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Martin et al. and Bauerschmidt et al., further in view of Waters et al. (U.S. Patent No. 5,070,706); rejected claim 8 under 35 U.S.C. § 103(a) as being unpatentable over Martin et al. and Bauerschmidt et al., further in view of Bernstein (U.S. Patent No. 5,711,607).

Applicant gratefully acknowledges the Examiner's indication that claims 5-7 and 9-14 would be allowable if rewritten to overcome the rejection under 35 U.S.C. § 112,

FINNEGAN
HENDERSON
FARABOW
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DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
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second paragraph, and to include all of the limitations of the base claim and any intervening claims. However, Applicant defers a rewriting of these claims to place them in condition for allowance pending the Examiner's reconsideration of the rejections under 35 U.S.C. § 103(a) on the basis of a combination of the Martin et al. and Bauerschmidt et al. references.

As set forth in MPEP §§ 2143 and 2143.01, to establish a *prima facie* case of obviousness, "there must be some suggestion or motivation, either in the references themselves, or in the knowledge generally available to one of ordinary skill in the art... to combine reference teachings." What constitutes such a suggestion or motivation, is detailed in § 2143.01.

In this case, the Martin et al. reference discloses a thermal sensor for detection of potential mechanical failures and includes a frequency generating circuit, and a cap freeing mechanism in a bolt such that when heat capable of generating mechanical failures is detected, a cap enclosure for the bolt is freed from a head portion of the bolt, an antenna under the cap is extended and a frequency generating circuit is activated to communicate the detected heat to a remote receiver. The operation of the device disclosed in the Martin et al. patent is summarized with reference to Fig. 3 at column 6, line 44 to column 7, line 37.

As the Examiner acknowledges, the Martin et al. patent does not teach a temperature sensing SAW element but instead relies on an expansible detecting means 32, which upon reaching a predetermined threshold temperature, will expand to lift the piston 36 and battery 52 and apply an upward force against the sealing cap 22 to overcome its adhesive bond, thus permitting release and extension of an antenna 56. It

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HENDERSON
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GARRETT &
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1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
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is apparent that the device of the Martin et al. patent does not measure variations in temperature, but rather responds only to a temperature threshold and as such, is either on or off. It is equally apparent that the Martin et al. device is intended to be replaced after a single use. In particular, once the antenna 56 of Martin et al. is extended, it is presumed that the condition causing that extension will be attended to and the entire sensor unit replaced.

Bauerschmidt et al. discloses an encapsulated switching installation which includes a plurality of internal SAW elements 7a-7d and a plurality of external SAW elements 7e to 7g disposed outside of the encapsulation. Each of the SAW elements includes an antenna, though it is apparent that none of the individual SAW elements is individually encapsulated. In fact, all of the external elements 7e-7g illustrated in Fig. 2 of the Bauerschmidt et al. patent drawings are not "encapsulated."

The Examiner's basis for combining Martin et al. and Bauerschmidt et al. is that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the temperature sensor disclosed by Martin with the encapsulated SAW temperature sensor, as taught by Bauerschmidt, because both of them are alternate types of temperature sensors that will provide the same function, of measuring temperature of an inaccessible moving part and transmitting it to an antenna, if one is replaced with the other." (Office Action, page 4, third full paragraph.)

It is respectfully submitted that the Examiner's analysis fails to account for the absence in Bauerschmidt et al. of an encapsulated SAW sensor. Bauerschmidt et al. discloses an encapsulated switching installation in which uncapsulated SAW sensors are disposed both inside and outside of the encapsulation. Further, Applicant disagrees

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
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that the sensors of Martin et al. and Bauerschmidt et al. are merely "alternate types of temperature sensors which will perform the same function." While it is acknowledged that the SAW sensor 7d of Bauerschmidt et al. will measure temperature, it is clear that the detecting means 32 in Martin et al. will not measure degrees of temperature, but merely respond by expansion upon the occurrence heat in excess of a threshold temperature. In addition, it is noted that the expansion function in the Martin et al. patent is indispensable to the intended operation of the disclosed device to attain removal of the cap 22 and allow extension of the antenna 56 to transmit as an indication of excess temperature. Substitution of the SAW temperature of Bauerschmidt et al. into the device of Martin et al. could not bring about this result. For that reason, the replacement of the temperature detector 32 in Martin et al. with the SAW temperature sensor 7d of Bauerschmidt et al. would destroy the operation of the Martin et al. disclosure. Thus, it clearly could not be obvious to one skilled in the art to make this substitution relied on by the Examiner to find obviousness in his rejection of claims 1-3, 4 and 8, under 35 U.S.C. § 103(a), and those rejections should be withdrawn.

Applicant respectfully requests reconsideration and reexamination of this application and the timely allowance of the pending claims.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

If any extension of time under 37 C.F.R. § 1.136 is required for entry of this response, and not accounted for by an attached request and fee payment by check, please grant such extension and charge the required fee to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P.

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By: _____
Robert F. Ziems
Reg. No. 19,096

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

Appendix to Amendment
U.S. Application No. 09/937,304
Filed: December 20, 2001

Amended Claims:

1. (Amended) A device for measuring temperature of the inside of an inaccessible movable mechanical part, comprising:

a temperature-sensitive element [with] having a SAW chip [(11)] with temperature-dependent transfer function, [where] the SAW chip [has] having a transducer designed to be connected to an antenna [(17)] mounted on [the] an outside of said mechanical part,

[characterized in that the temperature-sensitive element is provided in] an encapsulation [(14; 15; 15a)] for said temperature-sensitive element, the encapsulation being [which is] designed to be placed and kept in position in a mounting hole in said moving mechanical part and thus exposed to [measure] temperature inside the mechanical part, and

[that the device comprises] a [coaxial] transmission line [(18)] for connecting the antenna [(17)] to the temperature-sensitive element,

whereby the device [thus being] is adapted for measuring temperature [deep] inside the inaccessible mechanical part while [this] the mechanical part is in motion.

2. (Amended) A device according to claim 1, wherein [characterized in that] said encapsulation [(14; 15; 15a)] is composed of a hollow bolt [(15, fig. 3)] designed to be screwed into said mounting hole, [and where] the

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HENDERSON
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GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
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temperature-sensitive element is arranged internally in the bolt, and [while] the antenna is provided at [the] a part of the bolt which protrudes from said mechanical part.

3. (Amended) A device according to claim 2, wherein [characterized in that] said bolt [(15, fig. 3)] is filled internally with a material [(19) which keeps] for keeping the temperature-sensitive element in position.

4. (Amended) A device according to claim 3, wherein [characterized in that] said material [(19)] is epoxy or a heat-resistant rubber sleeve.

5. (Amended) A device according to claim 1, wherein [characterized in that] said encapsulation [(14; 15a)] is designed to be arranged separately at [the lower] an inner end of said mounting hole and [that] the device further comprises a bolt [(15b)] for closing the mounting hole and a material [(19; 19a, 19b) which is designed to be] placed between said bolt [(15b)] and the encapsulation [(14; 15a), thus] for holding the encapsulation [(14; 15a)] securely in position after mounting.

6. (Amended) A device according to claim 5, wherein [characterized in that] said material [(19; 19a; 19b)] is a spring [which, when the device is mounted, presses] for pressing the encapsulation [(14; 15a) down] against the [lower] inner end of the mounting hole.

7. (Amended) A device according to claim 5, wherein [characterized in that] said material [(19; 19a; 19b)] is epoxy or a heat-resistant rubber sleeve.

8. (Amended) A system for monitoring the temperature inside [one or more] inaccessible movable mechanical parts, [where there is arranged inside

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Washington, DC 20005
202.408.4000
Fax 202.408.4400
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the respective parts which are to be monitored] comprising:

[at least one] a sensor [(1) comprising] for each of the mechanical parts and including a temperature-sensitive element [with] having a SAW chip [(11)] with a temperature-dependent transfer function, [and where each] the SAW chip [has] having a transducer [which is] connected to a [respective] first antenna [(17) which is] mounted on the outside of the respective mechanical part[,];

[characterized in that the temperature-sensitive element is provided in] an encapsulation [(14; 15; 15a) which is] for the temperature-sensitive element, the encapsulation being placed and kept in position in a mounting hole in the respective mechanical part to measure temperature inside the mechanical part,[; that] the temperature-sensitive element [is] being connected to the first antenna via a transmission line; [(18),] and

[that for each sensor (1) there is provided] a second antenna [(2)] for the sensor of each mechanical part and [which is] arranged [in such a manner that it can] to transmit signals to and receive signals from [this] the respective sensor [(1)] via said first antenna [(17)] while the mechanical part is in motion, said second antenna being connected via a signal cable [(5)] with a control unit [(3) which, if the system contains more than one sensor (1), comprises] comprising a multiplexer; [and]

[that] wherein the control unit [(3) is arranged to be able to transmit] includes means for transmitting a polling signal to and [receive] for receiving a modified polling signal from [any of the sensors (1)] the sensor of each mechanical part via an associated signal cable [(5)] and associated second

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GARRETT &
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1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
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antenna [(2)] while the respective mechanical part is in motion, the control unit [(3) being] further [arranged to process] including means for processing the received modified polling signal, and, on the basis of the characteristics of the modified polling signal, [to generate] for generating a data signal [which is] representative for the temperature of the sensor [(1)] of the respective mechanical part.

9. (Amended) A system according to claim 8, [characterized in that on said SAW chip there are provided] wherein a plurality of reflectors [(13)] are provided on said SAW chip, and [that] the control [device (3) is designed to be able to measure] unit includes means for measuring the absolute phases of the components of the modified polling signal [which are] connected to the respective reflectors and to generate said data signal [by means] on the basis of the differences between these absolute phases.

10. (Amended) A system according to claim 8 or 9, [characterized in that] wherein the control device [(3)] is further connected to a recording device [(4)] via a data bus [(6)] and is arranged to transmit said data signal which is representative for the temperature of the sensor [(1)] to the recording [unit (4)] device.

11. (Amended) A system according to claim 10, [characterized in that] wherein the recording device [(4)] comprises a store for storing the received data signals or values [which are] derived therefrom and a display device for displaying information on these stored values graphically or in the form of alphanumeric characters.

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12. (Amended) A system according to claim 10_1 [or 11, characterized in that] wherein the recording device [(4)] is arranged to generate a signal [which indicates] indicating an alarm condition when it receives a data signal [which indicates] indicating that the temperature at one of the sensors [(1)] is higher than a predefined threshold value.

13. (Amended) A system according to claim 12, [characterized in that] wherein said signal indicating an alarm condition activates a visual or audible alarm.

14. (Amended) A system according to claim 12, [characterized in that] wherein said signal indicating an alarm condition results in a reduction in the load, a reduction in the drive speed or shutting down of a machine, an engine or a process [in which] including the mechanical part whose temperature is being monitored [is included].

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